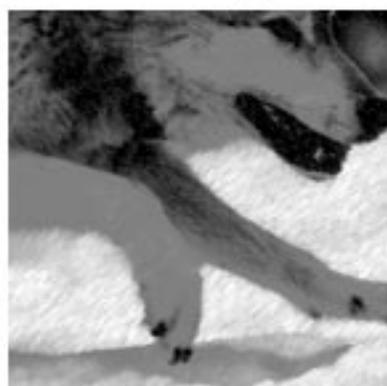
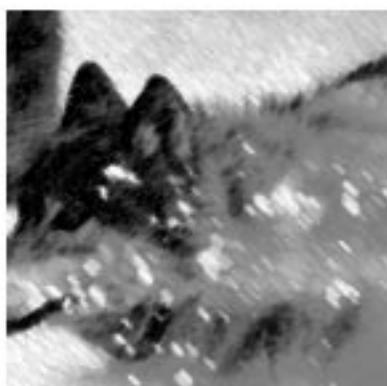




YELLOWSTONE
WOLF
PROJECT



BIENNIAL
1995

REPORT
1996

Yellowstone Wolf Project

Biennial Report
1995 and 1996



Michael K. Phillips and Douglas W. Smith
National Park Service
Yellowstone Center for Resources
Yellowstone National Park, Wyoming

YCR-NR-97-4
1997

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Cover illustration: Wolf pup #47, born to #27, of the Nez Perce Pack in 1996. Original drawing by Melissa Saunders, cover design by Renee Evanoff.

SUMMARY

After 20 years of planning and study, wolves were reintroduced into the greater Yellowstone ecosystem. Fourteen wolves in 1995 and 17 wolves in 1996 were captured in Canada, translocated to Yellowstone, placed in acclimation pens for ten weeks (three pens in 1995 and four pens in 1996), and then “soft” released into the wild. After release, and an exploratory period, all but one released wolf pack settled in the vicinity of their acclimation pens.

Wolves unexpectedly bred in the acclimation pens both years, with two litters born in 1995 and two in 1996 (although one of the females that bred in the pen died before giving birth shortly after release in 1996). Three litters were bred and born in the wild in 1996, so population growth exceeded the expectations of the Environmental Impact Statement (EIS). At the end of 1995, there were 21 wolves in three packs, and at the end of 1996, 51 wolves in nine packs.

The wolves fed primarily on elk, although moose, deer, a pronghorn antelope, and a mountain goat were also preyed upon. No bison were killed, although wolves tested them on several occasions. Wolf kill rates were generally high, with an elk killed on average by a pack of wolves about every 1.1 to 5.0 days. Wolf depredation on livestock was less than what was predicted in the EIS.

Some released wolves were recaptured and placed into captivity for management reasons. Two wolves died during 1995 and nine during 1996. Human activity, including motor vehicle accidents and legal and illegal killing, was the primary cause of mortality.



INTRODUCTION

How Wolf Restoration Came About

The gray wolf (*Canis lupus*) was purposefully shot, trapped, or poisoned in Yellowstone National Park (YNP) from its establishment in 1872 until 1933, when the National Park Service (NPS) ended its predator control efforts. By the mid-1930s, however, the last wolf pack was gone from Yellowstone.

It was not until 1972 that then Assistant Secretary of the Interior, Nathaniel Reed, organized the first official meeting to discuss wolf restoration in Yellowstone with authorities on conservation of predators. The participants recommended conducting a study to determine whether any wolves still inhabited the park. After completing the study, biologist John Weaver wrote in the 1978 report to the U.S. Department of the Interior, *The Wolves of Yellowstone*: “The wolf niche appears essentially vacant. Therefore, I recommend restoring this native predator by introducing wolves to Yellowstone.” A plan to recover the gray wolf throughout the northern Rocky Mountains, approved in 1980 and revised in 1987, specifically called for reintroducing wolves to Yellowstone.

In 1992 Congress directed the U.S. Fish and Wildlife Service (USFWS), in consultation with the NPS and the

U.S. Forest Service (USFS), to develop an Environmental Impact Statement (EIS) on reintroducing the gray wolf to Yellowstone and central Idaho, launching one of the most extensive public involvement efforts ever conducted on a natural resource issue. During the next two and a half years, the EIS team held more than 130 hearings and meetings and considered 160,000 public comments from every state and 40 foreign countries. Within two months after completion of the EIS in April 1994, Interior Secretary Bruce Babbitt and Agriculture Secretary Michael Espy signed a *Record of Decision and Statement of Findings on the EIS*, officially endorsing the restoration of wolves to Yellowstone National Park.

Program Objectives

Restoring wolves to Yellowstone is part of a larger effort to recover the gray wolf throughout the northern Rocky Mountains. The objective is to restore a population of wolves in the Greater Yellowstone Area (GYA) that

Wolf #34 was translocated from British Columbia in 1996. Photo by William Campbell.

includes at least ten packs that have produced pups for three consecutive years. When this objective is met and similar populations are present for three consecutive years in central Idaho and northwest Montana, the gray wolf will be removed from the list of endangered species in the northern Rocky Mountains and managed as a resident species by the states of Montana, Wyoming, and Idaho.

The USFWS and NPS concluded that translocating wolves from Canada would be the most certain and cost-effective means of restoring the gray wolf to the GYA. The agreed-upon plan called for releasing about 15 wolves in YNP each year for three to five consecutive years.

Summary of 1995 and 1996 Results

During the first two years of the restoration program, 31 wolves were translocated from Canada to YNP, 14 wolves in January 1995 and 17 wolves in January 1996 (Table 1). After spending about ten weeks in separate acclimation pens, three packs were released in 1995 and four packs in 1996, with the wolves wearing radio collars so their movements could be monitored.

It was anticipated that as the wolf packs established their territories, some would leave the park occasionally or permanently and travel across or inhabit private land, and some of the 412,000 livestock in the GYA would be preyed upon. However, only 10 to 12 sheep and no cattle

Table 1. Wolves translocated to Yellowstone in 1995 and 1996.

| New Pack | Wolf ^a | Age | Probable Status | Original Pack | Lbs | Release Date ^b | Exit Date ^c |
|----------------------|-------------------|-------|-----------------|---------------|-----|---------------------------|------------------------|
| 1995 Arrivals | | | | | | | |
| Crystal Creek | 2M | Pup | Subordinate | Petite Lake | 77 | 3/21 | 3/31 |
| | 3M | Pup | Subordinate | Petite Lake | 80 | 3/21 | 3/31 |
| | 4M | Adult | Alpha | Petite Lake | 98 | 3/21 | 3/31 |
| | 5F | Adult | Alpha | Petite Lake | 98 | 3/21 | 3/31 |
| | 6M | Pup | Subordinate | Petite Lake | 75 | 3/21 | 3/31 |
| | 8M | Pup | Subordinate | Petite Lake | 72 | 3/21 | 3/31 |
| Rose Creek | 7F | Pup | Subordinate | McLeod | 77 | 3/22 | 3/24 |
| | 9F | Adult | Alpha | McLeod | 98 | 3/22 | 3/29 |
| | 10M | Adult | Alpha | Rick's | 122 | 3/22 | 3/24 |
| Soda Butte | 11F | Adult | Subordinate | Berland | 92 | 3/27 | 3/29 |
| | 12M | Adult | Subordinate | Berland | 112 | 3/27 | 3/29 |
| | 13M | Adult | Alpha | Berland | 113 | 3/27 | 3/29 |
| | 14F | Adult | Alpha | Berland | 89 | 3/27 | 3/29 |
| | 15M | Pup | Subordinate | Berland | 75 | 3/27 | 3/29 |
| 1996 Arrivals | | | | | | | |
| Chief Joseph | 31M | Pup | Subordinate | Kravec | 122 | 4/11 | 4/13 |
| | 32F | Adult | Alpha | Kravec | 113 | 4/11 | 4/13 |
| | 33F | Pup | Subordinate | Kravec | 89 | 4/11 | 4/13 |
| | 34M | Adult | Alpha | Unknown | 75 | 4/11 | 4/13 |
| Druid Peak | 38M | Adult | Alpha | Prophet | 122 | 4/14 | 4/27 |
| | 39F | Adult | Alpha | Besa | 113 | 4/14 | 4/27 |
| | 40F | Pup | Subordinate | Besa | 89 | 4/14 | 4/27 |
| | 41F | Pup | Subordinate | Besa | 89 | 4/14 | 4/27 |
| | 42F | Pup | Subordinate | Besa | 75 | 4/14 | 4/27 |
| Lone Star | 35M | Adult | Alpha | Chief | 122 | 4/5 | 4/5 |
| | 36F | Adult | Alpha | Besa | 113 | 4/5 | 4/5 |
| Nez Perce | 26F | Pup | Subordinate | Halfway | ? | 4/2 | 4/2 |
| | 27F | Adult | Alpha | Halfway | 115 | 4/2 | 4/2 |
| | 28M | Adult | Alpha | Halfway | 130 | 4/2 | 4/4 |
| | 29M | Pup | Subordinate | Halfway | 100 | 4/2 | 4/4 |
| | 30F | Pup | Subordinate | Halfway | 100 | 4/2 | 4/2 |
| | 37F | Pup | Subordinate | Halfway | 90 | 4/2 | 4/2 |

^a M or F refers to male or female.

^b Release date is date the pen gate or panel was removed.

^c Exit date is the date the wolves actually left the pen.

were killed by wolves during the first two years, which was fewer than expected. The wolves preyed primarily on elk, with a pack killing an elk every two to three days.

Nine pups were born in the spring of 1995, and 14 in the spring of 1996. Two wolves died during 1995 (one hit by a vehicle and one shot illegally), and nine in 1996 (two hit by vehicles, two from pack rivalries, two shot illegally, one from thermal burns, and two from unknown causes).

In some cases wolves have had to be captured and penned temporarily for their own welfare or to reduce the possibility of conflicts with livestock. A female wolf and her eight pups were penned for five months in 1995 after her mate was shot illegally and there were concerns she would not be able to care for the pups herself. In 1996, 11 wolves from two packs were held in captivity for varying lengths of time, and 12 wolves from two packs

outside the GYA were brought to Yellowstone to be held until their release in 1997.

As of December 31, 1996, the GYA supported 40 free-ranging wolves: 33 of them belonged to eight packs that should produce pups during 1997, two related wolves were traveling together without an alpha male, two existed as loners, and three had unknown fates (Table 2). Twelve wolves were being held in captivity awaiting release. Except for one female wolf that sometimes traveled about 70 miles north of Livingston, Montana, and returned, the wolves remained within the GYA, and most made extensive use of habitats within the park (Figure 1).

Looking Forward

The wolves will be closely monitored to learn about

Table 2. Wolf population in the GYA as of December 31, 1996.

| Pack | Wolf | Age | Probable Status | Radio-Collared | Pack | Wolf | Age | Probable Status | Radio-Collared |
|----------------------------|-------|-------------|-----------------|-----------------------|---|----------|----------|-----------------|----------------|
| Free-Ranging Wolves | | | | | | | | | |
| Crystal Creek | 5F | Adult | Alpha | Yes | Nez Perce | 27F | Adult | Alpha | Yes |
| | 6M | 2 years | Alpha | Yes | | 48(?) | Pup | Subordinate | No |
| Rose Creek | 8M | 2 years | Alpha | Yes | Unnamed family | 30F | Yearling | Alpha | Yes |
| | 9F | Adult | Alpha | Yes | | 35M | Adult | Alpha | Yes |
| | 16F | Yearling | Subordinate | Yes | Unnamed family | 15M | 2-year | Alpha | Yes |
| | 17F | Yearling | Subordinate | Yes | | 26F | Yearling | Alpha | Yes |
| | 18F | Yearling | Subordinate | No | Lone wolves | 28M | Adult | Loner | Yes |
| | 19F | Yearling | Subordinate | Yes | | 39F | Adult | Loner | Yes |
| | 21M | Yearling | Subordinate | Yes | Unknown condition | 23M | Yearling | Unknown | No |
| | 51? | Pup | Subordinate | No | | 49? | Pup | Unknown | No |
| | 52? | Pup | Subordinate | No | | 50? | Pup | Unknown | No |
| 53? | Pup | Subordinate | No | Captive Wolves | | | | | |
| Soda Butte | 13M | Adult | Alpha | Yes | Nez Perce (in Rose Creek pen) | 29M | Yearling | Unknown | Yes |
| | 14F | Adult | Alpha | Yes | | 37F | Adult | Unknown | Yes |
| | 24F | Yearling | Subordinate | Yes | Sawtooth (in Rose Creek pen) | 63F | Pup | Unknown | Yes |
| | 43M | Pup | Subordinate | Yes | | 64F | Pup | Unknown | Yes |
| | 44F | Pup | Subordinate | Yes | | 65F | Pup | Unknown | Yes |
| Chief Joseph | 33F | Yearling | Alpha | Yes | | 66M | Pup | Unknown | Yes |
| | 34M | Adult | Alpha | Yes | | 67F | Pup | Unknown | Yes |
| Druid Peak | 31M | Yearling | Subordinate | Yes | | 68F | Pup | Unknown | Yes |
| | 38M | Adult | Alpha | Yes | 69M | Pup | Unknown | Yes | |
| | 40F | Yearling | Alpha (?) | Yes | 70M | Pup | Unknown | Yes | |
| | 41F | Yearling | Subordinate | Yes | 71F | Pup | Unknown | Yes | |
| | 42F | Yearling | Subordinate | Yes | 72M | Pup | Unknown | Yes | |
| Leopold | 2M | 2-year | Alpha | Yes | Central Idaho visitors (in Nez Perce pen) | | | | |
| | 7F | 2-year | Alpha | Yes | 7M | Yearling | Unknown | Yes | |
| | 54(?) | Pup | Subordinate | No | 11F | Adult | Unknown | Yes | |
| | 55(?) | Pup | Subordinate | No | | | | | |
| | 56(?) | Pup | Subordinate | No | | | | | |

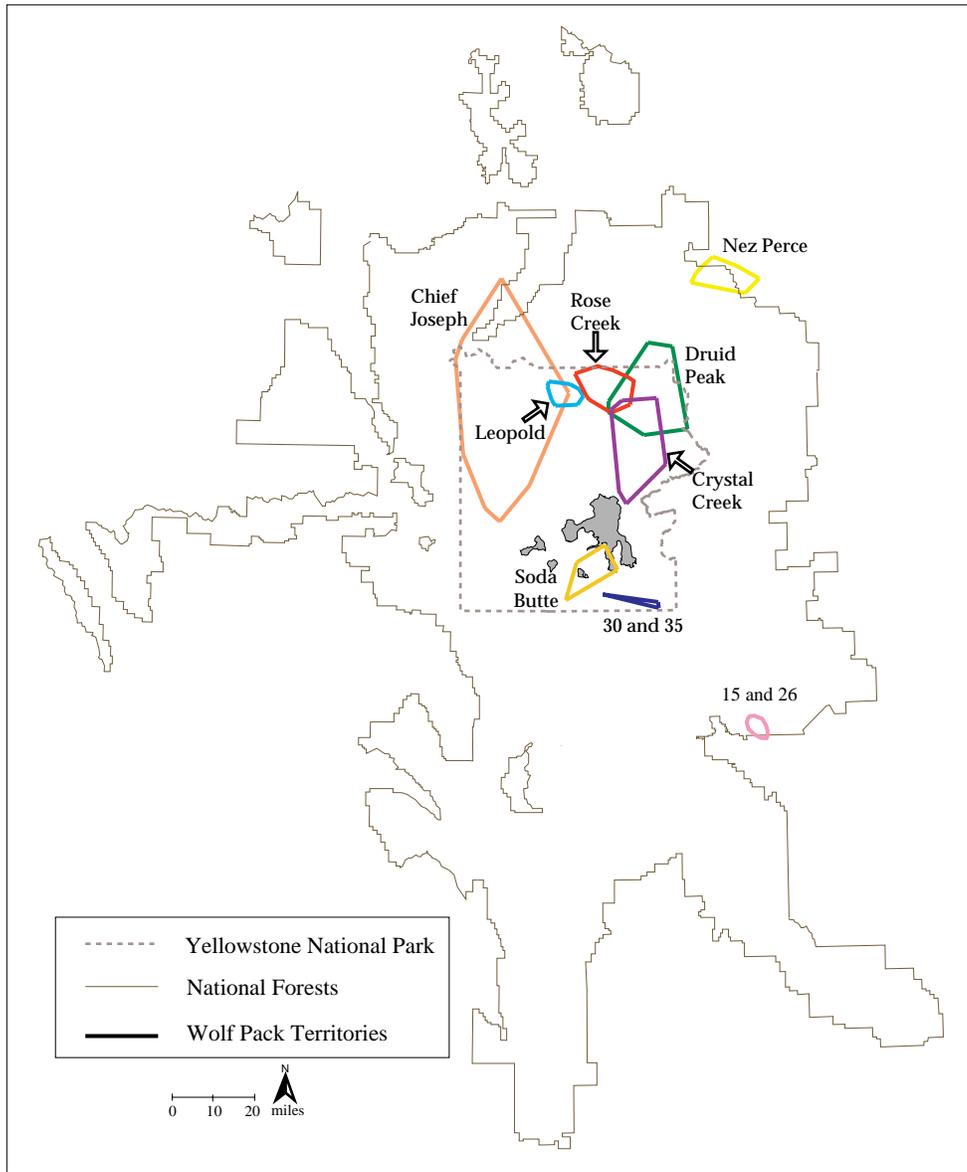


Figure 1. Yellowstone wolf pack territories in the greater Yellowstone area, 1996.

their effects on other ecosystem inhabitants, to respond to any problems that may arise, and to determine if and when the goal of a self-sustaining population of wolves has been reached. Long-term monitoring will enable park biologists to document adult wolf survival and mortality, population dispersal and distribution, wolf prey selection and killing rates, and pup survival.

The program is progressing better than predicted in the EIS concerning wolf restoration to the GYA. Wolves

are thriving, producing more pups than expected, killing few livestock, and settling within the GYA (Tables 1 and 3). If pup production approaches expectations in 1997, it is likely that at least 75 wolves in eight or more packs will inhabit the GYA by the end of the year. If the overall trends for 1995 and 1996 continue, the recovery goal for the gray wolf population in the GYA will probably be achieved by 2002. 🐾

TRANSLOCATION

Site Selection

The wolves translocated in 1995 came from an area east of Jasper National Park, near Hinton, Alberta, Canada, about 550 miles (880 km) north of Yellowstone; those in 1996 came from an area east of Williston Lake in British Columbia about 750 miles (1,200 km) north of Yellowstone (Figure 2). Both sites were selected because of their similarities to the Yellowstone area—rolling and rugged terrain, dotted with meadows and forests of aspen, fir, spruce, and lodgepole pine, and supporting a large elk population. In addition, wolves in the selected areas were free of rabies, brucellosis, and tuberculosis.

Canadian and U.S. wildlife agencies had cooperated in past transplant programs, including elk from Yellowstone and swift foxes from Wyoming that were sent to Alberta. The Alberta and British Columbia

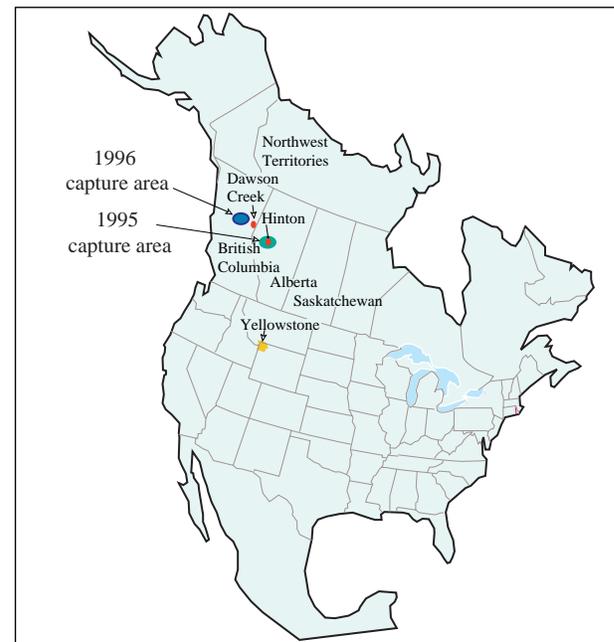


Figure 2. Areas in Canada where wolves were captured for transport to Yellowstone in 1995 and 1996.

Table 3. Outcomes of Yellowstone Wolf Restoration Program 1995 to 1996.

| Issue | Predicted Outcome | Actual Outcome |
|---|-------------------|----------------|
| Number of wolves reintroduced | 30 | 31 |
| Number of reintroduced wolves that do not contribute to population growth because of stochastic events ^a , conflicts with livestock that led to the wolf's death or placement in captivity ^b , mortality including illegal killing ^c | 14 | 9 |
| Number of reintroduced wolves surviving at end of second year | 16 | 22 |
| Number of pups born during first two years | 0 | 23 |
| Number of pups that died | - | 5 ^d |
| Number of wolves at end of second year | 16 | 40 |
| Number of reproductively active packs at end of second year | 0 | 8 |
| Number of cattle killed by a population of 21 wolves during first two years | 2 to 6 | 0 |
| Number of sheep killed by a population of 21 wolves during first two years | 18 to 22 | 10 to 12 |
| Wolves would travel to areas where circumstances would require that they be returned to wilderness areas or the park | Some | Some |
| Visitor use of area inhabited by wolves | Increase | Increase |

^a The EIS predicted that 33% of the wolves reintroduced in Yellowstone would not contribute to population growth because of stochastic events such as mortality, disappearance, dispersal, etc.

^b The EIS predicted that 10% of the wolves that are not subjected to stochastic events could possibly be removed annually because of conflicts with livestock.

^c The EIS predicted that 10% of the wolves that are not subjected to stochastic events could possibly die from natural causes, accidents, or illegal killing.

^d This number includes pup #46M who was permanently placed in captivity because of capture-related injuries.



Wildlife veterinarian Mark Johnson and mule drivers Bob Blackwell and Wally Wines and mules Bob and Hammer transport the first shipment of wolves in January 1995 to the Crystal Creek pen. NPS photo by Jim Peaco.

provincial governments approved the translocation with the understanding that humane methods of capture and transport would be used, and that the USFWS would cover the cost.

Wolf Shipment

The first shipment of eight wolves arrived in the park on January 12, 1995; a second shipment of six wolves arrived eight days later (Table 1). These wolves came from four different packs and included eight adults and six pups, nine males and five females, ranging in weight from 72 to 122 lbs (33 to 55 kg).

Two shipments of wolves also arrived in January 1996, including 17 animals from six packs: eight adults and nine pups, 11 females and 6 males, ranging in weight from 75 to 130 lbs (34 to 59 kg) (Table 1). 🐾

ACCLIMATION

What little is known about wolf restoration indicates that wolves that were immediately released after translocation tend to travel more widely and

in the general direction of home than wolves that were held in captivity for an extended period before release. To increase the likelihood that the translocated wolves would remain within the GYA (YNP and the surrounding national forests), they were kept in one-acre pens for about 10 weeks.

Pens

The pens used in 1995 were built along Crystal, Rose, and Soda Butte creeks (Figure 3), which flow through Yellowstone's northern range in the northern quarter of the park, an area that supports about 15,000 elk. The pens were located about five miles apart and one mile from the nearest paved road. The area's semi-open terrain enabled security personnel to maintain a constant vigil over the wolves.

The Crystal Creek and Rose Creek pens were used for acclimation again in the winter of 1996. The Soda Butte pen was relocated to Blacktail Plateau, also on the northern range, and another pen was constructed along Nez Perce Creek, in the Firehole River Valley, in an area that supports elk during winter. During the summer of 1996, the Crystal Creek and Blacktail pens were moved to sites near Pelican and Trail creeks, maximizing future

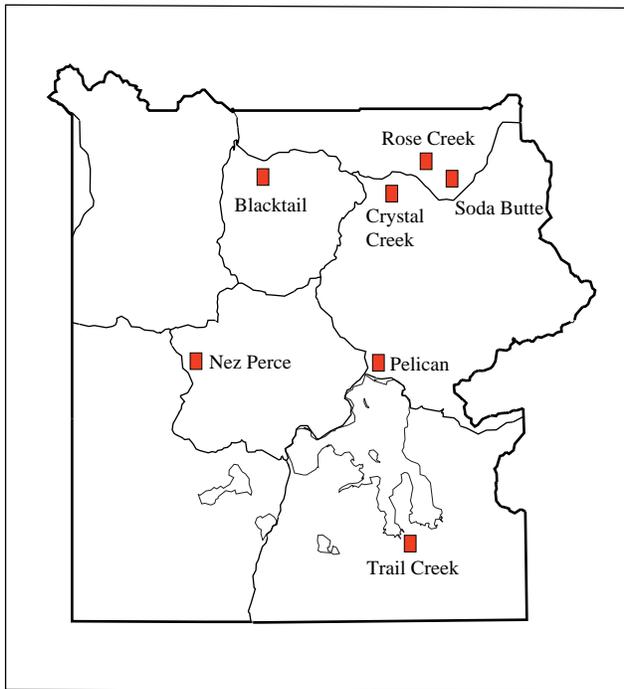


Figure 3. Locations of pen sites in Yellowstone.

management flexibility of wolves that might need to be temporarily penned.

The pens were constructed from prefabricated panels of nine-gauge, two-inch chain link mesh that stood 10-foot high. The fence had a two-foot, 45-degree interior overhang to prevent the wolves from climbing out and a

four-foot chain-link skirt along the inside edge to keep them from digging out. An electrical fence was constructed around each pen to keep other wildlife, especially bison, from rubbing against and damaging the pens, and to deter grizzly or black bears from trying to enter the pens.

The wolf packs were generally named for the acclimation pen in which they were placed. When the Crystal and Rose Creek pens were reused in 1996, the wolf packs were named for nearby geographic features, Druid Peak and the Chief Joseph Trail. The wolves kept in the pen on Blacktail Plateau were called the Lone Star Pack because they were released near Lone Star Geyser.

Human Contact and Feeding

To reduce the stress the wolves experienced during acclimation, human contact was minimized. Staff visited the pens only on feeding days. Road-killed elk, bison, deer and moose were provided at a rate of about 15 lbs (24 kg) per wolf per day.

During the early stages of acclimation in 1995, about 75 park employees and 25 media representatives were permitted to observe the feeding in small groups from a vantage point about 300 yards (100 m) from the Crystal Creek pen. But concern about the wolves being bothered by human presence was borne out. Whenever people approached the pen the wolves would become agitated,



Wolf #9 is the alpha female in the Rose Creek Pack. She was introduced to #10 in a pen. They paired and bred while in captivity and after release gave birth to eight pups near Red Lodge, Montana, in April 1995. After her mate #10 was killed, she spent the summer in the Rose Creek pen with her eight pups. She and her pups were released from the pen in October 1995. After release she immediately paired with wolf #8, who had dispersed from the Crystal Creek Pack. In 1996 they had a litter of three pups. NPS photo by Barry and Teri O'Neill.

running frantically about and sometimes jumping against and chewing at the fence.

Although the wolves never became tolerant of human proximity, their increasing acceptance of confinement became apparent after two to three weeks in both 1995 and 1996: the wolves stopped chewing on the fence, they ate all of the food provided, they rested for extended periods, they howled, and they exhibited breeding behavior, all of which suggested that acclimation could be done without harming the wolves.

Release

The wolves were released between March 21 and March 27 in 1995, and between April 2 and April 14 in 1996 (Table 1). In both years, similar factors dictated the timing: concerns about increasing grizzly bear activity as the bears emerged from their dens, and about pregnant wolves. To promote successful reproduction and maturation of the pups, the pregnant females were thought to require two to three weeks to adjust to a free-ranging lifestyle and locate suitable den sites before whelping.

To minimize the stress experienced by the wolves upon exiting the pens, gates were opened in the evening, with no humans remaining present in the vicinity. Park and USFWS biologists believed that such “soft” releases would increase the likelihood that the wolves would restrict their movements immediately after exiting the pens.

In 1995, the pens of the Crystal Creek and Rose Creek wolves were opened on March 21 and 22, respectively. On March 23, when the Crystal Creek wolves had not yet left their pen, a hole was cut in the chainlink in an area where they had spent considerable time. By March 31 all of the Crystal Creek wolves had left the pen. By March 24, the adult male of the Rose Creek Pack, wolf #10M, and probably the female pup, wolf #7F, had left. Adult female #9F left the pen around March 29. On March 27 a hole was cut in the chainlink in an area of the Soda Butte pen where the wolves had spent considerable time. By the morning of March 29, all the wolves had left through the hole.

In 1996, the wolves also took varying periods of time to exit their pens. Because of a concern that established wolf packs might kill or displace the Chief Joseph and Lone Star packs if released directly from their pens, the Chief Joseph and Lone Star wolves were chemically



On March 21, 1995, the new Yellowstone wolf era began. Wolf project leader Michael Phillips and U.S. Fish and Wildlife Service biologist Steven Fritts had the honor of opening that first gate. NPS photo by Douglas Smith.

immobilized and transported to deliberately incomplete enclosures (i.e., the Nez Perce pen with one panel missing and a small partial pen constructed along Lone Star service road). The wolves were allowed to recover from the drugs in the absence of people and exit when they chose. 

POPULATION MOVEMENTS AND STATUS

Overview

Although there was a concern that translocation and acclimation might disrupt the social ties that bound the wolves in Canada, this was not necessarily the case. After their release, the wolves’ movements were

monitored by tracking the animals in the snow, and by observation from the air and ground. Snow tracking indicated that all the wolves left the pens in an undisturbed manner and initially explored the immediate area before traveling more extensively.

The distance traveled per day and the size of the area used varied among the packs (Table 4). In 1995, an abrupt increase in movements signaled the beginning of the exploratory period after about three weeks, but time for each movement period cannot be assigned because it varied by pack. While these exploratory movements did not appear to be attempts to return to Canada, they all included a northerly component. Post-release behavior and movements of wolves can be categorized into three periods: 1) the restricted period where wolf movements were centered around the pen (2-14 days), 2) the exploratory period, where wolves ranged widely (3-35 days), and 3) the settled period where wolves returned to the area around their pen and began territorial behavior (>35-40 days) (Table 4 and Figures 4-6). Except for the Nez Perce Pack, whose movements are described on page 12, the 1996 wolves showed similar movements as those wolves released in 1995.

Pairings of unfamiliar males and females in one of the 1995 pens (Rose Creek) and three of the 1996 acclimation pens appeared successful. The first pairing resulted in the first known litter in greater Yellowstone, eight pups born to wolf #9F in April 1995. The female and pups survived with some assistance after the alpha

male, #10M, was illegally shot near Red Lodge, Montana. In 1996, unfamiliar wolves in the Druid Peak and Chief Joseph packs remained together until the female dispersed or was killed. The Lone Star Pack, which included only two wolves, came to an early end when one of them died of probable thermal burns in April.

The changes in and current status of each pack are summarized below and in Table 2.

Crystal Creek Pack

After an exploratory phase during which the six Crystal Creek wolves traveled about 37 miles (59.5 km) northeast of the park, they returned to the park and settled into an area in the northeastern portion of the park (Figure 4). While they were only infrequently located as an intact pack through late July, the two adults were always together and often with one or more of the yearlings. In mid-October 1995, the yearling #8M dispersed from the pack and immediately paired with #9F of the Rose Creek Pack. In mid-December, the yearling #3M dispersed from the pack and traveled as a lone wolf until it was removed for preying on livestock near Dry Creek, Montana, in February 1996.

A pup that had exited the pen after the other wolves, #2M, did not rejoin the pack until early May 1995, and then dispersed permanently in January 1996, joining up with a female from the Rose Creek Pack. The three

Table 4. Wolf pack movements after release in 1995.

| | Daily Distance Traveled | Size of Area |
|---------------------------|-------------------------|--|
| Crystal Creek Pack | | |
| Restricted period | 4 mi/6.4 km | 114 mi ² /291 km ² |
| Exploratory period | 14 mi/22 km | 304 mi ² /778 km ² |
| Settled period | 3 mi/4.8 km | 497 mi ² /1,272 km ² |
| Soda Butte Pack | | |
| Restricted period | 2 mi/3.2 km | 58 mi ² /148 km ² |
| Exploratory period | 14 mi km | 66 mi ² /169 km ² |
| Settled period | NA | 949 mi ² /2,429 km ² |
| Rose Creek Pack | | |
| Restricted period | 1 mi/1.6 km | 122 mi ² /312 km ² |
| Exploratory period | 19 mi/14 km | 646 mi ² /1,653 km ² |
| Settled period | NA | 65 mi ² /166 km ² |

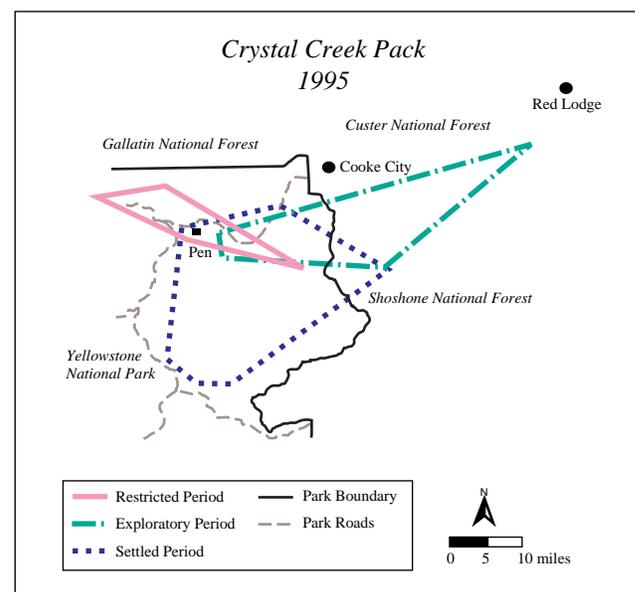


Figure 4. Areas in YNP and adjacent national forests used by Crystal Creek Pack during 1995.

remaining Crystal Creek wolves (#4M, #5F, and #6M) continued to use a territory that included the Lamar Valley, Mirror Plateau, and Pelican Valley. In April 1996, they denned near Soda Butte Creek, and on May 7 had a confrontation with the Druid Peak Pack that resulted in the death of Crystal's alpha male, #4M and presumably a litter of pups. The last two Crystal Creek wolves stayed together afterward but did not return to the den area, resulting in the loss of their litter. Subsequently, they restricted their movements to 265 mi² (687 km²) of the upper Lamar River, Mirror Plateau, and Pelican Valley (Figure 1).

Soda Butte Pack

After their release, the five Soda Butte wolves traveled together about 20 miles (32 km) to the north into the Absaroka-Beartooth Wilderness in the Custer National Forest, an isolated location that limited observation of their denning and post-denning activity. After #14F gave birth in the Stillwater River drainage in late April 1995, other pack members restricted their movements to an area near the den site. In mid-July, when the only known pup was capable of traveling with the pack, they moved south to the Slough Creek drainage in the park, where they remained through mid-September. By mid-December the pack had begun moving more widely, increasing the size of their territory (Figure 5).

Two adults (#11F and #12M) dispersed in February 1996 and both were shot, one illegally near Meeteetse, Wyoming, in March, the other near Merna Junction, Wyoming. The other four wolves spent the winter along the northern front of the Beartooth Mountains about 35 miles (56 km) north of the park.

In April 1996, #14F established a den on private property and whelped three pups. After the presence of the den near active livestock operations caused concern among local residents, the USFWS decided to capture the pack for release in the southern part of the park. (See "Wolf Management," page 17.) Six of the seven wolves were caught and put in the Crystal Creek pen until being moved to the Trail Creek pen, near the southeast arm of Yellowstone Lake, in August. One of the pups (#45F) died of unknown causes while in captivity; the other five were released on October 7 and subsequently restricted their movements to an 80 mi² (208 km²) area near Heart Lake (Figure 1).

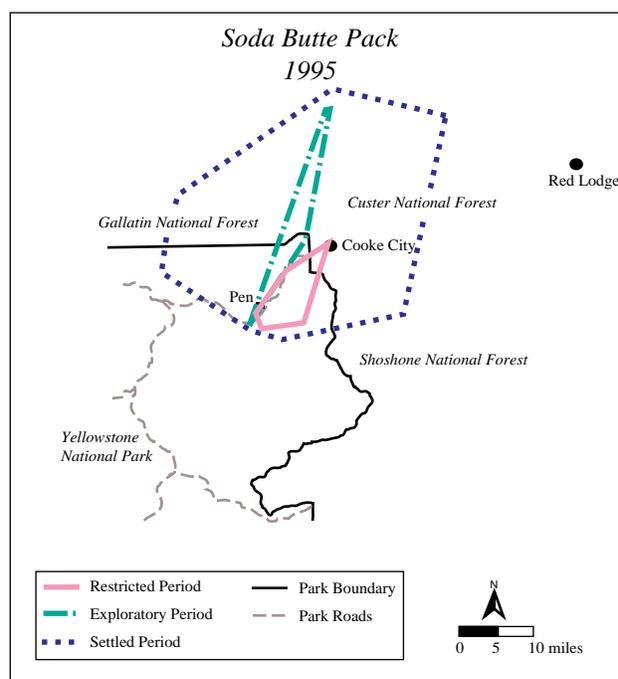


Figure 5. Areas in YNP and adjacent national forests used by Soda Butte Pack during 1995. The settled period for Soda Butte wolves has been an ever expanding area of use. What is depicted here is total area used to date, but these wolves did exhibit a similar pattern to Crystal as after their exploratory phase they returned to the pen and moved out from there.

Having eluded capture, #15M ranged along the front of the Beartooth Mountains for about three weeks before beginning to associate with #27F, who had been released from the Nez Perce pen in April 1996. During an effort to capture #27F and her pups, #15M was caught and put in the Nez Perce pen until being released in August 1996. He immediately began traveling with #26F, a yearling which had been translocated in 1996 as a pup and released from the Nez Perce pen that spring. These wolves remained together, traveling the southern portion of the park through the end of 1996, and will be assigned a new pack name if they establish a territory and produce pups.

Rose Creek Pack

During their exploratory phase, wolves #9 and #10 traveled about 50 miles (80 km) northeast of the park. The pup (#7F) traveled with the alpha pair for six days but dispersed before #9 and #10 went to Red Lodge. In January 1996 #7F paired with #2M, which had dispersed

from the Crystal Creek Pack (see Leopold Pack, below).

On April 26, 1995, the alpha male (#10M) was shot and killed about 4 miles (6 km) south of Red Lodge, Montana, about 35 miles (56 km) northeast of the park. At about the same time and in the same area, his mate, #9F, gave birth to eight pups. Because her den was so close to Red Lodge and she had no other pack members to help provide food, #9F and the pups were captured and returned to the Rose Creek pen until October 11, when the pups were considered mature enough to fend for themselves if necessary. Immediately after release, #9F paired with the yearling #8M, which had recently dispersed from the Crystal Creek Pack. Through the end of 1995, the nine wolves of the Rose Creek Pack established a territory in the Lamar Valley (Figure 6).

In late April 1996, #9 gave birth to three pups in a den near Slough Creek. On June 14 an encounter with the Druid Peak Pack resulted in the death of the yearling #20M. The 11 remaining wolves occupied a territory around the den and a rendezvous site on Buffalo Plateau that measured 114 mi² (295 km²) and extended west from the west end of Lamar Valley along the Yellowstone River to Cottonwood Creek (see Figure 6). On November 5 biologists found an uncollared black wolf from the Rose Creek Pack, probably #23M, with the newly formed Leopold Pack, but by early December it had dispersed from the Rose Creek Pack. This left the Rose Creek Pack

with two adults, five yearlings, and three pups at the end of 1996 (Figure 1).

Leopold Pack

In late January 1996, a new pack formed on the Blacktail Deer Plateau when #7F, originally from the Rose Creek Pack, paired with #2M, who had recently dispersed from the Crystal Creek Pack. The pack was named in honor of Aldo Leopold, who in 1944 advocated returning wolves to Yellowstone. The pack established a territory encompassing 41 mi² (106 km²) (Figure 1) and produced three pups in the spring.

Druid Peak Pack

After their release in April 1996, the five Druid Peak wolves established a territory in a 312 mi² (809 km²) area of the Lamar Valley and neighboring drainages that included their acclimation pen (Figure 1). After wide-ranging forays in May, the alpha female (#39F) began traveling alone in mid-August, moving about 100 miles (160 km) north of the park and later returning. During a telemetry flight on December 12, she was observed with two gray canids that were larger than coyotes but smaller than herself. They may have been two of the pups born to #27F from the Nez Perce Pack, but their identification has not been verified. As of December 31, 1996, #39F was considered a lone wolf.

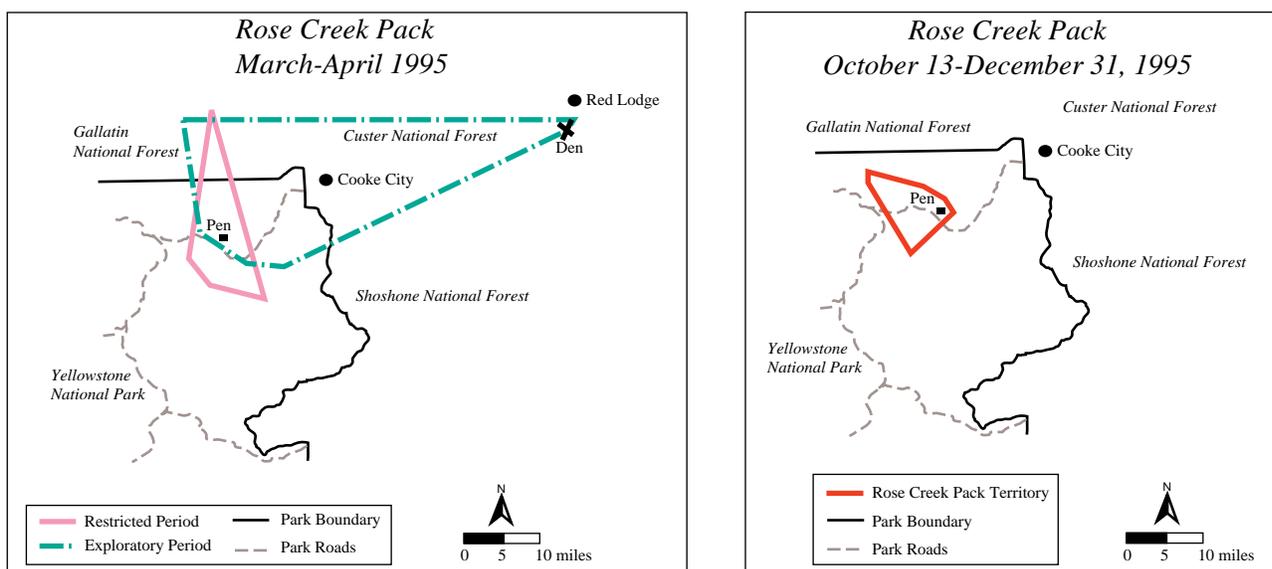


Figure 6. Areas in YNP and adjacent national forests used by Rose Creek Pack during 1995.

The adult male in the Druid Peak Pack (#38M) had meanwhile begun showing interest in one of the yearlings (#40F), which by year end had appeared to have become the alpha female. In late August a yearling from the Chief Joseph Pack (#31M) joined the Druid Peak wolves, bringing their pack to a total of five wolves as of December 31, 1996.

Chief Joseph Pack

After their release in April 1996, three of the four Chief Joseph wolves established a territory of 1050 mi² (2719 km²) in the Gallatin Range. One of the pups left the pack the first day after being released and traveled alone for many months before joining the Druid Peak Pack in August. The alpha female (#32) was fatally hit by a truck on highway 191 north of West Yellowstone, Montana, on June 25. The remaining wolves, yearling #33F and adult #34M, continued to travel together in the northwestern GYA (Figure 1).

Lone Star Pack

After acclimation in a pen on Blacktail Plateau, the two Lone Star wolves were released along Lone Star service road near Old Faithful on April 5, 1996. They moved two miles (3.2 km) before restricting their movements for nine days. Wolf #36F was found dead of probable thermal burns on April 14th. After her death, #35M began traveling widely until early September, when he paired with #30F from the Nez Perce Pack in the Thorofare area in southeastern YNP, where they remained through the end of the year (see Figure 6). They will be given a new pack name if they establish a territory and produce pups.

Nez Perce Pack

The six Nez Perce wolves exited their pen in two groups after a hole was cut in it on April 2, 1996. A foursome that included the alpha female and three female siblings (#27F, #26F, #30F, and #37F) left immediately, traveling northeast for four days at an average rate of 33 miles a day (53 km/day) before restricting their movements to an area south of Red Lodge, Montana.

On April 10, the alpha #27F left the pups and traveled widely until April 22, when she established a den near Nye, Montana, where she give birth to five pups.

Having preyed on sheep, #27 became subject to a concerted capture effort by mid-summer. (See “Wolf Management,” page 17.) One of the pups (#46M) was injured during capture efforts and had to be placed in permanent captivity. A second pup (#47M) was captured and placed in an acclimation pen until being released in September; soon after its release it was fatally struck by a vehicle in the park.

The alpha #27F and the other three yearlings eluded capture through the end of 1996. However, since #27 was observed with only one pup on December 18 (and subsequently during early 1997), it appeared likely that the other two (possibly #49 and #50) had dispersed; their fate was considered unknown as of December 31, 1996.

After #27F began traveling alone, the three sister yearlings traveled throughout the GYA in the manner of lone wolves searching for mates. Females #26 and #30 found mates (#15M from Soda Butte and #35M from Lone Star), with whom they traveled through the end of 1996.

The alpha male (#28) and the male pup (#29) left the acclimation pen three days after the females. Their initial movements were not as wide-ranging, averaging 26 miles a day (42 km/day) for three days, and they parted ways after about two weeks. Wolf #29M eventually met up with his sister (#37), but by mid-summer they were frequenting an area where livestock grazed on public and private land and were returned to captivity in the park. The alpha #28M traveled widely throughout the northwest part of the GYA through the end of 1996. 🐾

REPRODUCTION AND DENNING ECOLOGY

Pup Production

Although the stress of capture, translocation, and acclimation was expected to disrupt the female wolves’ reproductive cycles, two of the three translocated packs produced litters in 1995. On May 8, biologists found that #9F of the Rose Creek Pack had eight pups, and on June 16, that #14F of the Soda Butte Pack had given birth to at least one pup (Table 5). Both litters are believed to have been born about April 26. The alpha



In late April 1995 a litter of eight pups from wolves #9 and #10 were born near Red Lodge, Montana. After #10 was shot and killed, #9 and the pups were relocated in May back to the Rose Creek pen in the park. NPS photo by Barry and Teri O'Neill.

female from the Crystal Creek Pack (#5) excavated and explored five potential den sites and behaved as if she was going to give birth, but did not. (See *Canadian Field-Naturalist*, 1996 (110):343-345.)

In April 1996, 14 pups were born to the Leopold, Rose Creek, Soda Butte, and Nez Perce packs (Table 5). The Crystal Creek litter was assumed to have been abandoned or killed during a skirmish with the Druid Peak Pack that led to the death of Crystal Creek's alpha male. The Lone Star alpha female was pregnant at the time of her death.

Denning Ecology

Because there were greater expectations for pup production in 1996, a more concerted effort was made to study denning ecology than in the prior year. Except for the Crystal Creek den, which an extensive search failed to locate, each den site used in 1996 was inspected after it had been abandoned. Dens used by the Leopold and Soda Butte packs were extensive underground excavations in hillsides. The Rose Creek Pack's first den was under a large boulder, while a second den was an extensive underground excavation in sagebrush flats. The Leopold and Rose Creek dens were visible from 1 to 2 miles away (1.6 to 2.4 km). The den used by #27F from

the Nez Perce pen was an above-ground nest situated under a rock overhang.

On June 26, the three Leopold pups were moved to a rendezvous site several miles away, where they remained until they began traveling with the alpha pair in early September. From May until September 4, project personnel observed the Leopold den and rendezvous site for 331 hours; wolves were in view 96 hours (29% of the time spent watching the site.) During the first eight weeks of den monitoring, the female was present 76% of the time, whereas the male was present 44% of the time.

The Rose Creek alpha female moved her three pups to a second den on May 22 and to a rendezvous site between May 27 and June 10. In late June, the pups were moved to a second rendezvous site on Buffalo Plateau where they remained until late August, when they began

Table 5. Wolves born in the GYA during 1995 and 1996.

| Den Location and Estimated Birth Date | Wolf Numbers | Status as of 12/31/96 |
|--|------------------------------|-----------------------|
| Rose Creek Pack | | |
| Near Red Lodge, Montana; April 26, 1995 | 16F, 17F, 18F, 19F, 21M, 23M | with pack |
| | 20M, 22M | dead |
| Slough Creek; April 20, 1996 | 51?, 52?, 53? | with pack |
| Soda Butte Pack | | |
| Absaroka-Beartooth Wilderness, Montana; April 26, 1995 | 24F | with pack |
| Private property on north front of Beartooth Mountains; April 25, 1996 | 43M, 44F | with pack |
| | 45F | dead |
| Nez Perce Pack | | |
| Near Nye Montana; April 25, 1996 | 46M | in captivity |
| | 47M | dead |
| | 48?, 49?, 50? | with pack |
| Leopold Pack | | |
| Blacktail Plateau; April 20, 1996 | 54?, 55?, 56? | with pack |



Wolf Project volunteer Linda Thurston examines a wolf den used by the Leopold Pack in 1996. The Leopold Pack was the first naturally forming wolf pack in Yellowstone in over 60 years. They had three pups in 1996. NPS photo by Douglas Smith.

traveling with the rest of the pack (the alpha pair and six yearlings). From April 30 through June 18, project personnel observed the Rose Creek dens and first rendezvous site for a total of 177 hours; wolves were in view 94 hours (53% of the time). During the first seven weeks of den monitoring, the alpha female was at or near the den 82% of the time, whereas the alpha male was present 29% of the time. Yearlings were often at or near the den when one or both adults were present, and always so when both adults were absent.

Other Wildlife at Dens

Grizzly bears: When a grizzly bear came within 600 feet (200 m) of the Rose Creek den, the alpha female and two yearlings antagonized the bear to keep it away. The alpha female was most involved; she often chased and circled the bear, moving it away from the den.

Grizzlies were observed in the vicinity of the Leopold den on four occasions, but chased away only once. On two occasions the wolves did not respond and the bears left the area on their own accord. On the fourth occasion, a bear was in the den area while neither adult wolf was present. None of the pups was harmed.

Black bears: A small black bear observed near the Rose Creek rendezvous site was chased, probably by the alpha male, up an aspen tree. When the bear climbed down a minute later, the alpha female charged the bear and chased it from the site.

A black bear was observed near the Leopold den

twice when both adults were absent. On a third occasion, the alpha male was seen chasing two black bears from the den area. The alpha male later chased off a black bear traveling near the rendezvous site.

Coyotes: Although they were rarely seen near the Rose Creek den, coyotes were seen near the Leopold den 14 times.

Other wolves: The Chief Joseph Pack was seen near the Leopold den three times. Once, when the Leopold adults were absent, the Chief Joseph wolves explored the area without incident. Another time the Chief Joseph wolves did not closely approach. On the third occasion, the alpha male from the Leopold Pack chased and caught the Chief Joseph yearling #33F. Neither wolf was injured, but #33F immediately left the area. 🐾

FOOD HABITS

Kills were detected by locating wolves at or near the site of a carcass, noting evidence of an encounter between the wolves and the prey, and identifying the prey species.

1995 Monitoring

During 1995 staff detected a total of 44 kills made by wolves and another six that were probably made by wolves. Of these 50 kills, 43 (86%) were elk. Identification of five other kills was not possible, but they were

probably elk. The other two kills, both by the Soda Butte Pack, were of a female moose and a male mountain goat. There is no evidence that the wolves killed any other ungulate species during 1995.

Of the 43 elk killed, 13 (30%) were calves, 2 (5%) yearlings, 21 (49%) adults; for the remaining 7 (16%) the age could not be determined. Excluding calves ($N = 24$), the average age was 14.7 years. Twenty-two (51%) of the elk were females, 5 (12%) males; the sex of the other 16 (37%) was unknown.

Wolf kills observed opportunistically during tracking flights from March 31 through May 14 enabled biologists to estimate that the Crystal Creek and Soda Butte packs were making a kill every 6.3 and 3.4 days, respectively. Observers in the Lamar Valley who were watching for wolves daily from May 11 through July 6, recorded the Crystal wolves feeding every 5.2 days.

In mid-November 1995 we began a 30-day study of daily telemetry flights (weather permitting) and ground

tracking to determine kill rate. We calculated the kill rate by determining the number of kills made during a time period that began after a kill and ended on a kill, or the number of days between kills (the kill interval).

During the study period 14 elk kills were located: 3 (21%) calves, 10 (71%) adults, and 1 (7%) of unknown age (Table 6). Ten (71%) of the kills were cow elk, and the sex of the other 4 (29%) was unknown. The kill rate for the Crystal Creek Pack (5 wolves) was 2.7 days/kill, and for the Rose Creek Pack (10 wolves) 5.0 days/kill. Calculating the kill rate based on consecutive days that the wolves were located and observed (the probability of a kill being made without it being observed was low), the Crystal Creek Pack killed an elk every 1.5 days ($N = 4$ kill intervals). We had one complete interval on the Rose Creek wolves of 2 days between kills. Based on the number of kills found, the prey available to each wolf on a daily basis ranged from 5 to 15 lbs (2 to 7 kg).

Each kill was visited by a large number of scaven-

Table 6. Elk killed during 30-day monitoring periods.

| Pack | Pack Size | No. of Kills | Calf | Age Group | | |
|---|-----------|--------------|-------------|------------|-------------|------------|
| | | | | Yearling | Adult | Unknown |
| Mid-November to Mid-December, 1995 | | | | | | |
| Rose Creek | 10 | 5 | 1 | 0 | 4 | 0 |
| Crystal Creek | 5 | 8 | 2 | 0 | 5 | 1 |
| Soda Butte | 6 | 0 | 0 | 0 | 0 | 0 |
| #7F | 1 | 1 | 0 | 0 | 1 | 0 |
| Totals | 22 | 14 | 3 (20%) | 0 (0%) | 10 (70%) | 1 (10%) |
| March 1996 | | | | | | |
| Rose Creek | 9 | 20 | 8 | 0 | 9 | 3 |
| Leopold | 2 | 8 | 0 | 0 | 5 | 3 |
| Crystal Creek | 3 | 6 | 2 | 1 | 3 | 0 |
| Soda Butte | 4 | 1 | 0 | 0 | 0 | 1 |
| Totals | 18 | 35 | 10 (28%) | 1 (3%) | 17 (49%) | 7 (20%) |
| Mid-November to Mid-December, 1996 | | | | | | |
| Druid Peak | 5 | 21 | 16 | 2 | 2 | 1 |
| Rose Creek | 11 | 11 | 5 | 1 | 5 | 0 |
| Leopold | 5 | 7 | 6 | 1 | 0 | 0 |
| Crystal Creek | 2 | 2 | 1 | 0 | 0 | 1 |
| Chief Joseph | 2 | 4 | 1 | 1 | 2 | 0 |
| Soda Butte | 5 | 1 | 0 | 0 | 1 | 0 |
| #30 and #35 | 2 | 1 | 0 | 0 | 1 | 0 |
| Totals | 32 | 47 | 29 (62%) | 5 (11%) | 11 (23%) | 2 (4%) |



The primary food of wolves post-release was elk. Consumption of elk by wolves tended to be incomplete. All carcasses, however, were completely consumed by the scavenger community. NPS photo by Douglas Smith.

gers, mostly ravens and magpies. Most kills were visited by coyotes, and at least three were visited by grizzly bears.

1996 Monitoring

During 1996, project staff confirmed 114 wolf kills and identified an additional 28 ungulates that were probably killed by wolves. Of these 142 kills, 124 (87%) were elk. Identification of 13 kills was not possible, but they were probably elk. Other prey taken included two moose, an antelope, a mule deer, and a white-tailed deer.

Of the 109 documented elk kills, we were able to physically inspect 100 and perform necropsies on them. Of those examined, 34 (35%) were females and 17 (17%) were males; the sex of the other 49 (50%) could not be determined. Thirty-eight (39%) were calves, 3 (3%) yearlings, and 35 (36%) adults; 22 (22%) were of unknown age.

As was done during the 1995 winter study, the wolf packs were intensively monitored for 30-day periods in March and from mid-November through mid-December to determine the kill rate and the species, age, sex, and condition of the prey.

During March 1996, aerial tracking was done on 20 days, ground tracking on all 30 days. We spent a total of 271 hours looking for wolves and had the animals in view for 45 hours (17% of the time). We detected 35 elk kills in March: 20 by Rose Creek, 8 by Leopold, 6 by Crystal Creek, and 1 by Soda Butte (Table 6). Ten of the elk were

calves (28%), 1 (3%) was a yearling, and 17 (49%) were adults; the remaining 7 (20%) were of unknown age. Fifteen (29%) of the kills were females and 4 (11%) were males; the sex of the other 16 (46%) was unknown. The kill rate for all wolves, calculated using 23 kill intervals, was one kill every 1.6 days. The Rose Creek, Crystal Creek, and Leopold packs made kills every 1.3, 1.5, and 2.0 days, respectively. Calculating the kill rate based on the period between the first and last kills changes the estimates slightly, to one kill every 1.5, 2.8 and 2.2 days for Rose Creek, Crystal Creek, and Leopold, respectively. Data for the Soda Butte Pack were insufficient to calculate a kill rate for this time period.

During the mid-November to mid-December 1996 study period, aerial tracking was done on 13 of the 30 monitoring days. A total of 352 hours was spent in the field looking for wolves and had the animals in view for 103 hours (30% of the time). During this period, 47 elk kills were detected: 21 by Druid Peak, 11 by Rose Creek, 7 by Leopold, 4 by Chief Joseph, 2 by Crystal Creek, 1 by Soda Butte, and 1 by #30F and #35M (Table 6). Twenty-nine (62%) of the kills were calves, 5 (11%) were yearlings, and 11 (23%) were adults; the other 2 (4%) were of unknown age. Eleven (23%) were females and nine (19%) were males; the sex of the other 27 (53%) was unknown (23 were calves whose badly damaged skulls prevented sex determination). The kill rate for all wolves, calculated using 25 kill intervals, was one every 1.1 days. Calculating kill rate based on the period of time after the

first and on the last kill, changed the estimates slightly to one kill every 2.8, 3.2, and 1.6 days for Rose Creek, Leopold, and Druid Peak, respectively. The data for the other packs were insufficient to calculate a kill rate for this period. 

WOLF MANAGEMENT

As anticipated, situations arose in which recapture of certain translocated wolves or their pups was believed necessary or prudent for the long-term interests of the restoration program (Table 7). In addition, in 1996 Yellowstone was asked by the USFWS to accept 12 wolves from outside the GYA and hold them for release in 1997 (ten in Yellowstone and two in Idaho) (Table 7). In this respect the wolf restoration project differs from traditional wildlife biology, where the focus is on the welfare of an animal population as a whole rather than of specific animals. Because of the relatively small size of the wolf population in Yellowstone and the other two recovery areas, efforts have been made to ensure the survival of as many individuals as possible.

1995—Confinement of the Rose Creek Pack

The eight Rose Creek pups born after the death of the alpha #10M in April 1995 were captured and placed in the Rose Creek pen with #9F. Biologists from YNP and the USFWS wanted the pups mature enough to fend for themselves in her absence. Accordingly, we decided to release the family in mid-October when the pups would weigh about 50 lbs (22.6 kg).

While #9 settled into a routine of quiet acceptance of confinement the pups grew rapidly. When captured on May 18, they weighed just 5 lbs (2.3 kg), but by June 26, when we administered dewormer and vaccinations they weighed almost 20 lbs (9 kg). Summer progressed as expected until Saturday, July 29 when a wind-storm toppled two trees across the pen, collapsing the perimeter fence and creating large holes.

Since the wolf project is based out of Mammoth Hot Springs, about a one-hour drive from Rose Creek, we were unaware of the damage until Monday, July 31, when we went to the pen to feed. We found that all eight pups were missing and #9 was pacing nervously around the inside perimeter. During the next few hours, our howling

prompted three of the pups to return to the pen. Efforts to catch the remaining five were unsuccessful.

We repaired the pen and eventually captured two more of the pups. As we continued with capture efforts we established an observation post that allowed us to witness the habits and abilities of the three free-ranging pups. It soon became apparent that they did not need to be captured. We learned that the pups never wandered more than a few hundred yards from the pen. Strong social ties to #9 and their siblings held them securely to the area. We realized that even though they were not captive, they really had not been released. One evening we watched the wolves fend off two coyotes that seemed intent on displacing or killing them. After that, we felt much better about the pups' ability to survive the dangers of Yellowstone. We terminated capture attempts, continued to leave food outside the pen, and accepted that family would not be reunited until we opened the gate in mid-October.

On October 9, we went to the pen to administer vaccinations and outfit each pup with a radio-collar. As we captured the animals, we found that six were present instead of the five we expected. Apparently, some time during the last few days one of the three free-ranging had climbed in from the outside. While the pens were designed to prevent escapes by climbing, apparently they could be entered by climbing. During the 1995 acclimation period a red fox had climbed in the Soda Butte pen.

The family was released two days later. At that time, the two remaining pups were in the vicinity of the pen along with a young male known as #8M who had just dispersed from the Crystal Creek Pack. Park staff were understandably excited by #8's presence; before stepping outside the pen, #9 already had a suitor.

1996—Confinements Because of Livestock Concerns

From mid-June through mid-July, 1996, the alpha female from the Nez Perce Pack (#27F) killed at least eight sheep on private property near Fishtail, Montana. In response, staff from the USFWS, Animal Damage Control (ADC), and YNP attempted to capture her and her five pups so that they could be moved to a pen in the park far removed from livestock operations, but only pups #46M and #47M were caught.

Although they had not caused any livestock depreda-

Table 7. Free-ranging wolves that were placed in captivity in Yellowstone National Park during 1996.

| Wolf | Pack | Date Placed in Captivity | Reason for Placement | Capture Technique | Confinement Pen | Date Released | Release Site | Comments |
|---|------------|--------------------------|------------------------|-------------------|-------------------------|---------------|--------------|---|
| Wolves from GYA | | | | | | | | |
| 013M | Soda Butte | 06/05/96 | ensure survival | aerial darting | Crystal and Trail Creek | 10/07/96 | Trail Creek | doing well |
| 014F | Soda Butte | 06/05/96 | ensure survival | leghold trap | Crystal and Trail Creek | 10/07/96 | Trail Creek | doing well |
| 024F | Soda Butte | 06/05/96 | ensure survival | aerial darting | Crystal and Trail Creek | 10/07/96 | Trail Creek | doing well |
| 043M | Soda Butte | 06/05/96 | ensure survival | removed from den | Crystal and Trail Creek | 10/07/96 | Trail Creek | doing well |
| 044F | Soda Butte | 06/05/96 | ensure survival | removed from den | Crystal and Trail Creek | 10/07/96 | Trail Creek | doing well |
| 045F | Soda Butte | 06/05/96 | ensure survival | removed from den | Crystal and Trail Creek | n/a | n/a | wolf died in captivity |
| 029M | Nez Perce | 06/17/96 | ensure survival | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 037F | Nez Perce | 06/17/96 | ensure survival | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 015M | Soda Butte | 07/08/96 | ensure survival | leghold trap | Nez Perce | mid-August | Nez Perce | doing well |
| 046M | Nez Perce | 07/09/96 | livestock depredations | leghold trap | Crystal Creeks | n/a | n/a | permanently placed in captivity |
| 047M | Nez Perce | 08/06/96 | livestock depredations | leghold trap | Nez Perce | 09/17/96 | Nez Perce | died soon after released, vehicle collision |
| Wolves from northwestern Montana | | | | | | | | |
| 063F | Sawtooth | 08/29/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 064F | Sawtooth | 08/29/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 065F | Sawtooth | 08/29/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 066M | Sawtooth | 08/29/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 067F | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 068F | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 069M | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 070M | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 071F | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |
| 072M | Sawtooth | 09/08/96 | livestock depredations | aerial darting | Rose Creek | n/a | n/a | not released as of 12/31/96 |

tions, two other Nez Perce wolves and all seven Soda Butte wolves, who had established a den and produced three pups on private property near active livestock operations, were captured in June and July and placed in pens in the park to reduce the possibility of future problems. Except for #15M, who paired up with #26F from the Nez Perce Pack, the Soda Butte wolves remained together after their release in October and restricted their movements to the south-central portion of the park, about 15 miles (24 km) northwest of their release site.

The two Nez Perce wolves (#29M and #37F) had been harassing livestock on private property north of Gardiner, Montana, prior to their capture. Their release from the Rose Creek pen was postponed in order to include them in the release of the newly arrived pups from Augusta, Montana.

Wolves From Outside the GYA

After a naturally occurring pack that inhabited public and private land west of Augusta, in northwestern Montana, preyed on livestock in late summer, it was decided to kill some of the adults and send ten pups from the Sawtooth Pack to Yellowstone. To increase their chances of survival, they were put in the Rose Creek pen with #29M and #37F, to be released during late March 1997, when the area supports large numbers of wintering elk and bison. The pups should be able to survive the first few weeks of freedom simply by scavenging, and with a little experience become proficient predators.

In mid-December, two wolves from the central Idaho restoration effort (#B7M and #B11F) were sent to YNP for confinement after killing livestock in the Big Hole Valley of western Montana. It was hoped that a period of captivity would increase the likelihood that the wolves would not return to the Big Hole region after being released in Idaho sometime during 1997.

As a result of these new arrivals, 12 wolves were being held in pens in the park as of December 31, 1996. 

MORTALITIES

Two wolves died during 1995, and nine during 1996 (Table 8.) Three of the deaths occurred within 35 days after the wolf had been released from a pen. 

PUBLIC INVOLVEMENT

Legal Issues

Two lawsuits designed to stop the Yellowstone wolf restoration effort were filed in late 1994 as the first shipment of wolves was en route to Yellowstone. The American Farm Bureau Federation and the Rocky Mountain States Legal Foundation claimed that the transporting of wolves from Canada violated the Endangered Species Act. They argued that wolves in Canada were not threatened or endangered, that the reintroduced wolves would not be wholly separate geographically from naturally occurring wolves, and that administrative procedures had been violated and the EIS was flawed. A second lawsuit, filed by a Wyoming couple, claimed that the existing presence of naturally occurring wolves in Yellowstone prohibited their reintroduction. As of December 31, 1996, Judge William Downes, U.S. District Court, Cheyenne, had not ruled on the two cases.

Media Interest

The media has shown a keen interest in the wolf program, and throughout the two-year period wolf project and other park personnel gave numerous interviews to regional, national and international print, radio, and television journalists. Media interest was predictably highest during the days just before and after the wolves arrived from Canada and during the first release period in 1995.

Visits by Dignitaries

The media interest reflected and encouraged visits by politicians and dignitaries interested in the wolf project, including President Clinton and his family on August 25, 1995. The frequency of such visits declined in 1996, as the novelty of the restoration effort lessened.

Volunteer Program

The wolf project provided housing and a food stipend for volunteers who worked a minimum of three months (Appendix 1). In 1995, 10 volunteers worked a total of 3,400 hours (worth \$33,388 at a GS-5 level) In 1996, 16 volunteers worked a total of 8,360 hours (worth \$67,000 at a GS-5 level).

Table 8. Wolf mortalities in the Greater Yellowstone Area during 1995 and 1996.

| Wolf | Origin | Date of Release (or birth if in GYA) | Date of Death | Days surviving after release or birth | Location of death | Cause |
|------|--------------|--|------------------|---|------------------------|-----------------------|
| 10M | translocated | 3/22/95 | 4/26/95 | 34 | Red Lodge, MT | shot |
| 22M | born in GYA | 4/26/95 | 12/19/95 | 229 | Lamar Valley, YNP | vehicle |
| 3M | translocated | 3/31/95 | 2/05/96 | 312 | Dry Creek, MT | shot |
| 12M | translocated | 3/29/95 | 2/11/96 | 320 | Merna Junction, WY | investigation pending |
| 11F | translocated | 3/29/95 | 3/30/96 | 369 | Meeteetse, WY | shot |
| 36F | translocated | 4/05/96 | 4/14/96 | 10 | Lone Star Geysers, YNP | thermal burns |
| 4M | translocated | 3/31/95 | 5/21/96 | 418 | Soda Butte Creek, YNP | intraspecific strife |
| 20M | born in GYA | 4/26/95 | 6/21/96 | 423 | Buffalo Creek, YNP | intraspecific strife |
| 32F | translocated | 4/13/96 | 6/25/96 | 74 | West Yellowstone, MT | vehicle |
| 45F | born in GYA | 4/25/96 | 9/03/96 | 132 | Trail Creek pen, YNP | unknown |
| 47M | born in GYA | 4/25/96 | 9/21/96 | 5 ^a | Madison Junction, YNP | vehicle |

^a Wolf #47M was placed in captivity on 8/6/96 and released with #15M on 9/17/96; the number of days surviving was calculated relative to its release date.

Visiting Scholars Program

The wolf project sponsored a visiting scholar program to attract accomplished biologists to Yellowstone in the fall of 1995 and 1996 to assist with the design and implementation of natural resource programs. The 1995 visiting scholar was Dr. Rolf O. Peterson from Michigan Technological University, who has led the long-term studies of wolves and moose in Isle Royale National Park. While at Yellowstone, he helped establish research guidelines for the wolf restoration program, assisted with field work, and gave a public seminar on "Ecology of Gray Wolves in Isle Royale National Park."

In 1996, the visiting scholar was Dr. Todd Fuller from the University of Massachusetts, who has researched population dynamics and management of endangered carnivores. While at Yellowstone Dr. Fuller helped establish a framework within which wolf population data will be analyzed, helped prepare a proposal to secure funding to conduct an intensive ecological investigation of beavers in the park, and presented three seminars to park employees: "Ecology and Conservation of Wild Dogs in Africa: Implications for the Wolves of Yellowstone," "Timber Wolf Management and Delisting: Implications for the Rocky Mountain Wolf Recovery Program," and "Carnivore Population Ecology and Conservation."

Interpretation and Education Efforts

In 1995, wolf project biologists gave 18 presentations to conservation groups, interested citizens, and profes-

sional audiences and maintained regular contact with other federal and state agencies, conservation groups, ranchers, and private citizens interested in wolf restoration.

Yellowstone National Park's Interpretive Division estimated that during 1995 about 4,000 visitors saw or heard wolves in the Lamar Valley, where the chance of viewing or hearing a wolf became a major visitor activity. Visitor use of the Northeast Entrance increased about 20% during 1995, probably in large part because of the chance to see wolves.

Environmental education program coordinator Rich Jehle mailed 159 wolf information packets to grade school teachers and students, reaching as many as 4,800. Interpreters parkwide gave 73 wolf programs to 1,200 high school and university students, and members of special interest groups, including 280 NPS and concession employees at every major developed area in the park. Norm Bishop, research interpreter, mailed 515 wolf information packets to high school and university students and teachers, reaching as many as 15,450 classmates. Bishop also responded to 874 calls, most of which concerned wolves, prepared and led a Teton Science School seminar on wolf recovery, and assisted with the Yellowstone Institute's course on wolf recovery. He gave 90 interviews, mostly on wolves, to students, teachers, authors, editors, and producers of educational media. He reviewed several books about wolf recovery and corrected numerous errors.



Wildlife veterinarian Mark Johnson and researcher and Yellowstone visiting scholar Rolf Peterson transport one of the Rose Creek pups for processing prior to release. (Dr. Peterson is in charge of the wolf-moose studies on Isle Royale.) NPS photo by Barry and Teri O'Neill.

During 1996, project biologists gave 28 programs to about 3,500 people from various organizations or who attended various functions and managed a mailing list of 1,020 individuals who received about six updates about the project. We wrote numerous articles for technical and popular publications, one popular book, and weekly reports for inclusion in USFWS reports (Appendix 2). We managed a phone tree to inform local residents about wolf movements near Nye, Montana, and a phone line that provided information about the whereabouts of wolves in the GYA. We also worked with cinematographers from Busch Productions who were producing a documentary

on Yellowstone wolves that aired nationally on the Turner Broadcasting Station on November 3, 1996.

The Yellowstone Center for Resources created and produced eight *Wolf Tracker* newsletters in 1995 and four in 1996 and distributed thousands of them. The park newspaper, *Yellowstone Today*, in 1996 contained a special four-page insert about wolf restoration, which was distributed to about two million potential readers. *Yellowstone Science* also covered the wolf activities extensively.

Public Support

Many individuals and organizations support the wolf restoration effort. This support is greatly appreciated and of invaluable assistance. We would like to thank the major contributors listed below, along with the many other individuals who support this project.

- Mollie Beattie Memorial Fund
- Jim Biel Memorial Fund
- Call of the Wild Foundation
- Defenders of Wildlife
- Ms. Susan McElroy
- EverReady
- Hamilton Stores
- International Wolf Center
- Kodak
- Mr. Bob Landis
- Mr. Homer Luther
- Dr. L. David Mech
- National Fish and Wildlife Foundation
- National Geographic Society
- National Park Foundation
- A Naturalist's World
- Nikon
- North Star Foundation
- Dan Smith & Mill Pond Press
- Tocad America
- Turner Foundation
- John and Jeri Walton
- Ms. Dorothy Western
- Ms. Eleanor Williams
- The Wolf Education and Research Center
- The Wolf Fund—Renée Askins
- The WolfStock Foundation
- Woods Electronics
- The Yellowstone Park Foundation
- And many individual contributions made by hundreds of supporters. 

Appendix I. Volunteers with the Yellowstone wolf restoration program, 1995-1996.

| | Period of Involvement | Hours Contributed |
|------------------|--------------------------------|---------------------|
| 1995 | | |
| Chase Davies | 11/14/94 - 12/15/95 | NA |
| Deb Guernsey | 04/15/95 - 12/31/95 | (two days per week) |
| Brian Johnson | 01/01/95 - 04/15/95 | NA |
| Dan McNulty | 11/14/95 - 12/15/95 | NA |
| | 01/01/95 - 04/15/95 | NA |
| Lessie Redman | 1/5/95 - 4/30/95 | NA |
| Carrie Schaeffer | 9/1/95 - 5/20/96 | NA |
| J. Douglas Smith | 9/1/95 - 11/1/95 | NA |
| Nathan Varley | 1/15/95 - 12/15/95 | NA |
| 1996 | | |
| Carol Anderson | 01/01-01/29 | 160 |
| Isaac Babcock | 06/01-08/30 | 520 |
| Lisa Belmonte | 11/18-12/15 | 160 |
| Stewart Breck | 05/10-06/30 | 280 |
| Karin Clack | 05/22-08/13 | 480 |
| Carrie Schaefer | 01/01-05/20 | 800 |
| Deb Guernsey | 01/10-05/31 | 840 |
| Matt Hartsough | 08/03-12/15 | 600 |
| Will Henry | 04/29-08/06 | 560 |
| Alex Krevitz | 09/05-11/29 | 480 |
| Dan McNulty | 02/29-05/20 and 11/18-12/31 | 620 |
| Melissa Saunders | 09/09-12/31 | 640 |
| J. Douglas Smith | 01/01-02/29 | 360 |
| Linda Thurston | 04/10-06/30 and 09/01-12/31 | 1160 |
| Nathan Varley | 02/15-04/01 and 11/18-12/31 | 500 |
| Jonathan Way | 05/29-06/30 | 200 |

Appendix II. Publications

- Fritts, S.H., E.E. Bangs, J.A. Fontaine, M.R. Johnson, M.K. Phillips, E.D. Koch, and J.R. Gunson. 1997. Planning and implementing a reintroduction of wolves to Yellowstone National Park and central Idaho. *Restor. Ecol.* 5:1-20.
- Gilbreath, J.D., and M.K. Phillips. 1996. Red wolves and private land. Pages 161-164 *in* N. Fascione and M. Cecil, eds. *Wolves of America Conf. Proc.* Defenders of Wildlife, Wash., D.C.
- Mech, L.D., M.K. Phillips, D.W. Smith, and T.R. Kreeger. 1996. Denning behavior in non-gravid wolves (*Canis lupus*). *Can. Field-Nat.* 110:343-345.
- Phillips, M.K. 1996. Do we know how to restore wolves? Pages 41-46 *in* N. Fascione and M. Cecil, eds. *Wolves of America Conference Proceedings.* Defenders of Wildlife, Wash., D.C.
- _____. 1996. From the top. *Call of the Wild Newsl.* 1:2-3.
- _____. 1995. Wolf restoration is a touchstone. *Int. Wolf* 5:24.
- _____, and D. W. Smith. 1996. *The wolves of Yellowstone.* Voyageur Press.
- _____, and _____. Wolf restoration in Yellowstone National Park. Pages 8-13 *in* N. Fascione and M. Cecil, eds. *Wolves of America Conf. Proc.* Defenders of Wildlife, Wash., D.C.
- Smith, D.W. 1995. The founder wolves. *Int. Wolf* 5:18.
- _____. 1995. Adjusting to new sights, smells, and sounds in captivity. *Int. Wolf* 5:20.
- _____. 1996. From the field. *Call of the Wild Newsl.* 1:3, 6.
- _____. 1996. Life with Yellowstone wolves. *Wolf* 14:11-12.
- _____. 1996. Wolf Park provides stepping stone to Yellowstone. *Wolf Park Newsl.* 23:4.
- _____, and M.K. Phillips. 1996. Interactions of wolves and other wildlife in Yellowstone National Park. Pages 140-145 *in* N. Fascione and M. Cecil, eds. *Wolves of America Conf. Proc.* Defenders of Wildlife, Wash., D.C.

In Preparation

- Phillips, M.K., and D.W. Smith. Another great idea: restoring wolves to Yellowstone. *Wildl. Conserv.*
- _____, _____, and T.K. Fuller. Wolf recovery in the Greater Yellowstone Area: initial results and trends. *Conser. Biol.*
- Smith, D.W., and M. K. Phillips. 1996. Movements and food habits of gray wolves released in Yellowstone National Park. *In* P. Curlee, eds. *Greater Yellowstone predators: ecology and conservation in a changing landscape.* Third Biennial Conference on the Greater Yellowstone Ecosystem, Yellowstone National Park, Wyo.

Appendix III. Non-Profit Organizations Supporting Yellowstone Wolf Restoration

You can show your support by contributing to the Yellowstone Wolf Restoration Fund or one of the organizations listed below. These organizations have agreed to use most or all of the funds donated to them to directly further the restoration of Yellowstone wolves. With continued support from you and many others across the country, the howl of the wolf will continue to echo through the mountains and valleys of Yellowstone. Hopefully, you will be one of those fortunate enough to be listening.

Non-Profit Government Affiliates for Direct Giving to Yellowstone Wolves

Yellowstone Wolf Restoration Fund
The Yellowstone Park Foundation
P.O. Box 117
Yellowstone National Park, WY 82190
(307) 344-2293

The Yellowstone Foundation is a nonprofit organization that exists to enrich the human experience that is Yellowstone and to increase our understanding of the Park's history and natural systems. It is the principal fund-raising entity for the Yellowstone wolf project and accepts donations on its behalf. Donations can be earmarked for general support of the wolf project or specific activities such as wolf education, research, internship program, or endowments. The Foundation charges no administrative overhead for managing the wolf account so every dollar donated is directly applied to the restoration effort.

National Park Foundation
1101 17th Street NW, Suite 1102
Washington, D.C. 20036
(202) 785-4500

The National Park Foundation is a nonprofit organization chartered by Congress to receive gifts, manage funds, and help preserve the Nation's natural and historic heritage by providing private sector support to the National Park System. The National Park Foundation accepts donations on behalf of the Yellowstone wolf program.

National Fish and Wildlife Foundation
1120 Connecticut Avenue, NW
Suite 900
Washington, D.C. 20036

The National Fish and Wildlife Foundation is a Congressionally chartered nonprofit entity that provides creative and sustainable solutions for fish, wildlife, and plant conservation, and educates and inspires others to do the same. The Foundation invests in the best possible solutions to conservation problems by awarding challenge grants using federally appropriated funds to match private-sector funds. The Foundation will accept donations on behalf of Yellowstone's wolves.

Non-Profit Organizations Working on Behalf of Yellowstone's Wolves

Call of the Wild Foundation
25958 Genesee Trail Drive
UK-502
Golden, CO 80401-5742
(303) 526-0811

A nonprofit organization dedicated to ensuring the presence of wolves in Yellowstone National Park. By becoming a member of CWF, you can sponsor a Yellowstone wolf pack and receive the CWF newsletter. The sponsorship program is ideal for educators interested in sharing the wolf restoration project with students. Sponsorship kits, as well as note cards and posters, can be purchased in outlets in Yellowstone or by contacting Call of the Wild Foundation.

Defenders of Wildlife
Northern Rockies Regional Office
1534 Mansfield Avenue, Missoula, MT 59801

This nonprofit organization is dedicated to the conservation of wildlife. Using donations from supporters, DOW has established a fund to compensate ranchers for verified losses to wolves, shifting the economic consequences of wolf recovery from the individual rancher to the millions of people who want to see the wolf restored. DOW's wolf compensation fund needs support to continue implementation of this crucial aspect of wolf

recovery. Defenders will also pay \$5,000 to any landowner who permits and protects an active wolf den on his or her property.

The Wolf Education and Research Center
P.O. Box 3832
Ketchum, ID 83340

The Wolf Education and Research Center is dedicated to providing public education and scientific research concerning the gray wolf and its habitat in the northern Rocky Mountain region. WERC provides the public with the opportunity to observe and learn factual and balanced information about the wolf, and to develop workable ways for human to coexist with wolves.

International Wolf Center
5930 Brooklyn Boulevard
Minneapolis, MN 55429-2518

The International Wolf Center supports the survival of the wolf around the world by teaching about its life, its

association with other species, and its dynamic relationship to humans. Among the many activities and opportunities IWC provides is the spectacular “Wolves and Humans” exhibit in Ely, Minnesota, an exclusive magazine, trained and experienced speakers and programs, and extensive library holdings on wolves.

The WOLFSTOCK Foundation
P.O. Box 17847
Salt Lake City, Utah 84117

A Utah-based organization founded in 1995 the WOLFSTOCK Foundation has been engaged in fund raising and educational activities in direct support of the Yellowstone wolf restoration effort. The WOLFSTOCK Foundation has organized several successful events in their home state to further information sharing and generate support on behalf of the wolf program.